Trends on Gas Industrial Utilization

N. Afonso Moreira
Sonorgás – Sociedade de Gás do Norte, S.A.
Tel: +351 932 505 044, E-mail: nmoreira@dourogas.pt

1. Background

The population continues to be the main drivers of energy demand. In the last 20 years world population increased about 1.6 billion people, yet the trend rate of growth is falling.
The overall GDP growth tends to accelerate, driven by economies of low and medium-sized. Energy efficiency, as energy per unit of GDP will continue to improve globally. This restricts the growth acceleration of the global primary energy consumption.
According to the report "Energy Outlook 2030" (BP 2012), global consumption of primary energy is expected to grow about 1.6% per year over the period 2010 to 2030, corresponding to 39% increase in 2030. The growth rate decreased from 2.5% per year in the last decade to 2.0% in the period 2010-2020, and 1.3% for 2020-2030.

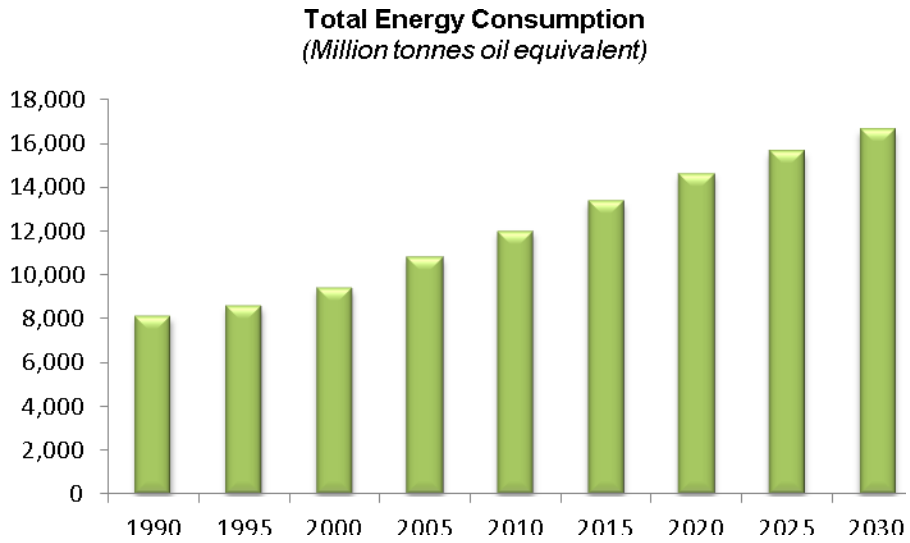


Figure 1 – Total Energy Consumption (Energy Outlook 2030).

Consumption by fuel type changes slowly, and gaseous fuels and non-fossil fuels will gain share at the expense of coal and oil.
The fastest growth will be renewable fuels (including biofuels) being expected a grow of about 8.2% per year between 2010-30. In fossil fuels natural gas has the greatest growth of about 2.1% per year.

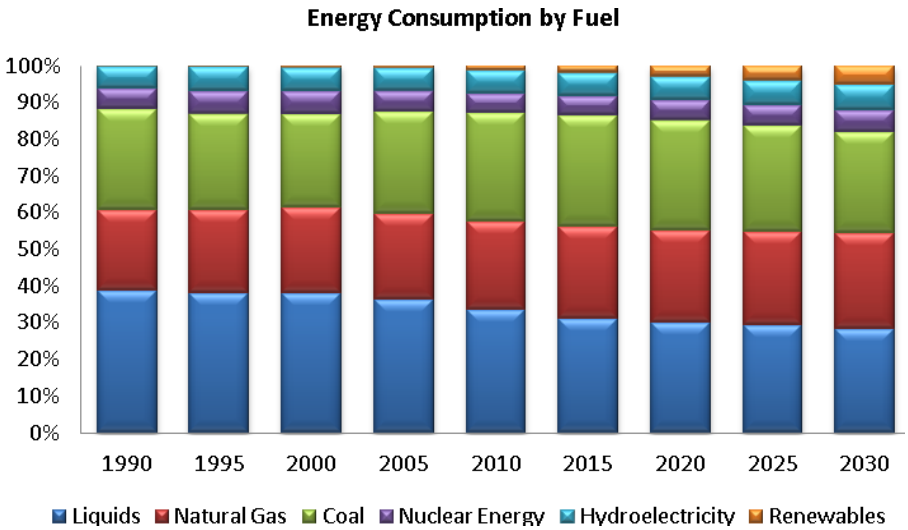
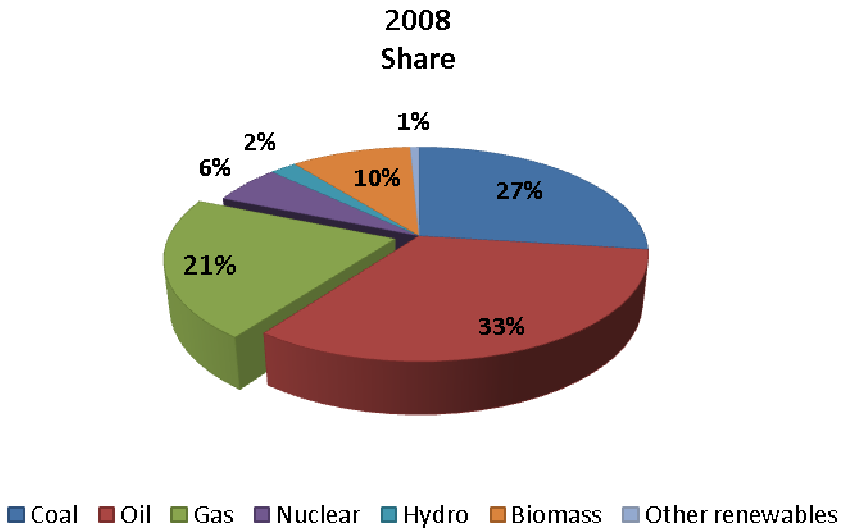


Figure 2 – Energy Consumption by Fuel ((Energy Outlook 2030; BP Statistics).

In the report "World Energy Outlook 2011 (IEA, 2011)" forecasts of growth in consumption of natural gas are even more favorable, specifically in the "The Golden Age of Gas Scenario".



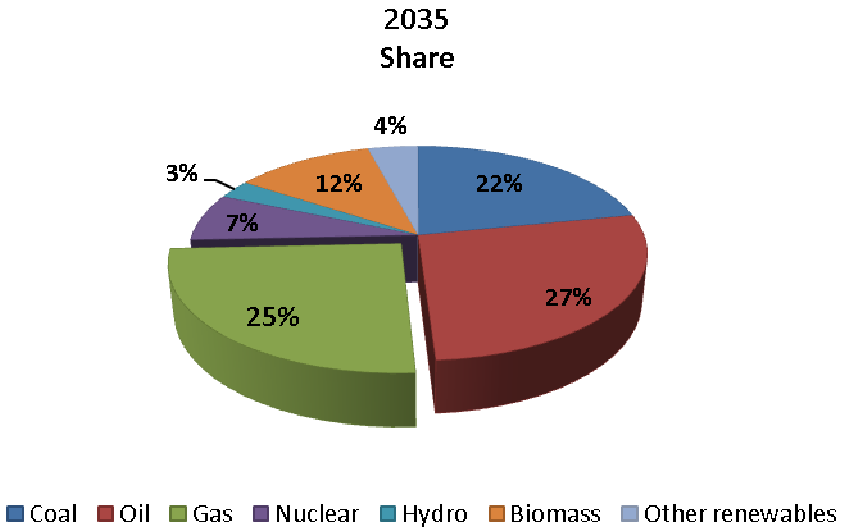


Figure 3 – Natural Gas in world's fuel mix (2008 and 2035).

The scenario forecasts indicate that natural gas will face a huge increase in demand, with an expected increase of 21% in 2008 to 25% in 2035 in the mix of fuels. The above scenario also forecasts that by 2030 the demand for natural gas exceeds the coal.

Keywords: natural gas, trends.

2. Aims

During the triennium 2009-2012 the WOC 5.1 has been holding several meetings with the aim of producing a report on the Industrial Gas Utilization
This report aims to characterize the natural gas market, and analyze the different uses of gas in industry.

3. Methods

The relatively recent shift towards use of natural gas for the generation of electricity has resulted in an anomaly in this traditional cyclical behavior. While requirements for natural gas heating decrease during the summer months, demand for space cooling increases during this warmer season (naturalgas.org).

In addition to this cyclical demand cycle, there are three primary drivers that determine the demand for natural gas in the short term (naturalgas.org):

- Weather - as mentioned, natural gas demand typically peaks during the coldest months and tapers off during the warmest months, with a slight increase during the

summer to meet the demands of electric generators.

- Fuel Switching - While most residential and commercial customers rely solely on natural gas to meet many of their energy requirements, some industrial and electric generation consumers have the capacity to switch between fuels.
- Economy - The state of the economy in general can have a considerable effect on the demand for natural gas in the short term, particularly for industrial consumers, and vice versa.

Natural gas prices are a function of market supply and demand. Due to limited alternatives for natural gas consumption or production in the short run, changes in supply or demand over a short period often result in large price movements to bring supply and demand back into balance.

Factors on the supply side that may affect prices include variations in natural gas production, net imports, or storage levels. Increases in supply tend to pull prices down, while decreases in supply tend to push prices up.

Higher demand tends to lead to higher prices, while lower demand can lead to lower prices. Factors on the demand side include (Energy Information Administration, US):

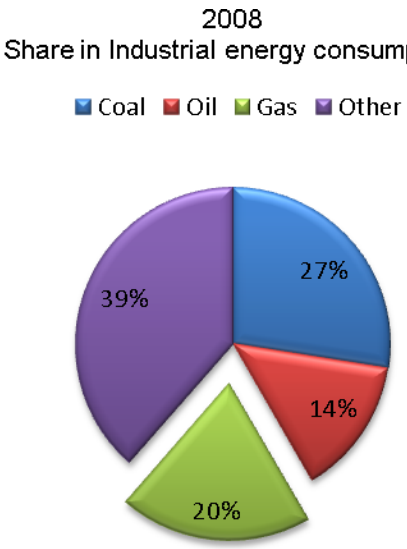
- Strong Economic Growth - Economic activity is a major factor influencing natural gas markets. When the economy improves, the increased demand for goods and services from the commercial and industrial sectors generates an increase in natural gas demand. This is particularly true in the industrial sector, which is the leading consumer of natural gas as both a plant fuel and as a feedstock for many products such as fertilizer and pharmaceuticals.
- Winter Weather - During cold months, residential and commercial end users consume natural gas for heating, which places upward pressure on prices.
- Hot Summer Weather - Temperatures also can have an effect on prices in the cooling season as many electric power plants that are operated to meet air conditioning needs in the summer are fueled by natural gas.
- Oil Prices Can Influence Natural Gas Demand -Some large-volume gas consumers (primarily industrial consumers and electricity generators) can switch between natural gas and oil, depending on the prices of each. Natural gas and coal markets can also interact when the price of natural gas falls significantly. Electricity generation using natural gas can even become attractive relative to coal-fired electricity generation in some areas of the Country.
- Because of this interrelation between fuel markets, when oil prices fall, the shift in demand from natural gas to oil pulls gas prices downward. When oil prices rise relative to natural gas prices, there may be switching from oil to natural gas, pushing gas prices upward.

The demand for natural gas is determined by a number of factors. The most relevant are: the level of economic activity; the competitiveness of natural gas compared with other energy sources; environmental issues; technological developments; the ease of access, and energy policies (IEA, 2011):

- Economic Activity - Economic activity is one of the most important determining factors in the demand for natural gas in existing markets. The relationship between economic activity and demand for natural gas is great. Rapid economic growth typically corresponds to a rapid increase in demand for natural gas. In markets with low economic activity usually natural gas demand tends to stagnate or decline.
  In markets already developed and established natural gas demand can be stimulated by economic growth through increased business and homes, which require natural gas for their heating needs; increased industrial activity, which increases gas consumption natural in industrial processes; and increasing demand for electricity, which increases the demand for natural gas for power-generation.
  The current uncertainty about the outlook for the global economy is also reflected in a large uncertainty on the demand for natural gas in the future.
- Competitiveness - As predicted, the competitiveness of natural gas is a determinant factor. Natural gas can, in most applications, be replaced by alternative fuels, so it is heavily exposed to competition.
  In the power-generation gas competes with coal, nuclear, renewables and the oil and its derivatives. In household and commercial competes with heating oil, liquefied petroleum and electricity.
  In many countries the demand for renewable and nuclear energy is supported by government policies and measures, limiting the position of the gas in competition with these forms of energy.
- Environment - Due to its environmental profile compared to coal and oil, natural gas has become increasingly the preferred fuel for energy end users, meeting the environmental policies and related measures adopted in several countries. Natural gas still comes as a perfect complement to renewable energy, which supports the growth outlook.
- Technology - The choice of fuel efficiency and gas consumption are strongly affected by developments in technology. Recent technical advances have been driven largely by efforts to increase efficiency to reduce costs, but the reductions of CO2 emissions are now a complementary objective.
  Changes in technology in terms of power-production offer the greatest potential to influence the choice of fuel. The CCGT, with high efficiency, give gas already a great advantage.
- Access to supply - The gas can only be consumed if the infrastructure of production and transport are sufficiently developed. The introduction of new natural gas markets requires a large investment. For such, investors must be confident in the future gas demand, and expected return on investment.
  The proximity of the gas resources has been a major influence in developing markets.
- Government policies - Policies and measures adopted by governments are also a key factor in choosing a particular fuel to the detriment of others. The application of taxes and subsidies may encourage the consumption of natural gas, or may decrease it if they are applied, for example, to renewable energy.
  The uncertainty on new policies and measures is high in many countries.

4. Results

There are many reasons for the long term expected increase in natural gas demand. As can be seen, demand for all types of energy, except nuclear and hydro power, is expected to increase over the next 20 years. This general upswing can be attributed to the expected general growth of the economy and population, (naturalgas.org).
Power-generation and transport stand out as the sectors with the greatest impact on future demand for natural gas. Power-generation due to their tendency to use natural gas, and transport by the high market potential.
The industry is leading the growth in final energy consumption, especially in rapidly developing economies. In 2030 the sector represents 60% of the expected (Energy Outlook 2030 "BP 2012).
In industry gas competes with coal, petroleum products, electricity and renewable.
The price is a critical factor in the choice for a fuel in industry. Other considerations are also important safety, efficiency, resource availability, environmental issues. In general, the gas can answer all these questions, being easy to handle, efficient, low environmental impact, etc..



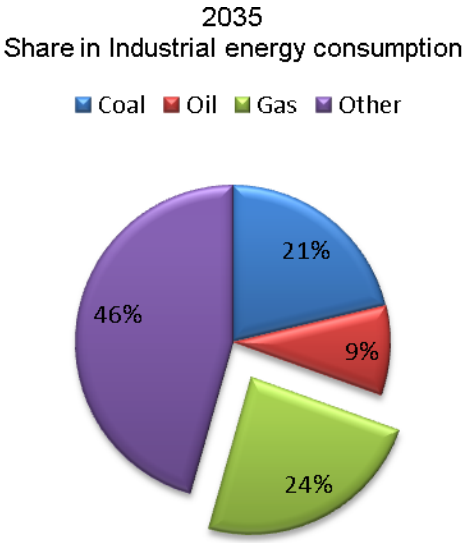


Figure 4 – Share in Industrial Energy Consumption in 2008 and 2035 (World Energy Outlook 2011; IEA, 2011).

According to the report "World Energy Outlook 2011" (IEA, 2011) in 2008 coal and oil accounted for about 80% in the mix of fuel consumption in the industrial sector, with the gas having a weight of about 20%. In 2035 it is anticipated that the gas reaches a share of 24% a with a total of 819 Mtoe.

References

Energy Outlook 2030; BP 2012

World Energy Outlook 2011; IEA, 2011

Energy Information Administration, US